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(11)

EP 0 790 357 A1

(12)

EUROPEAN PATENT APPLICATION

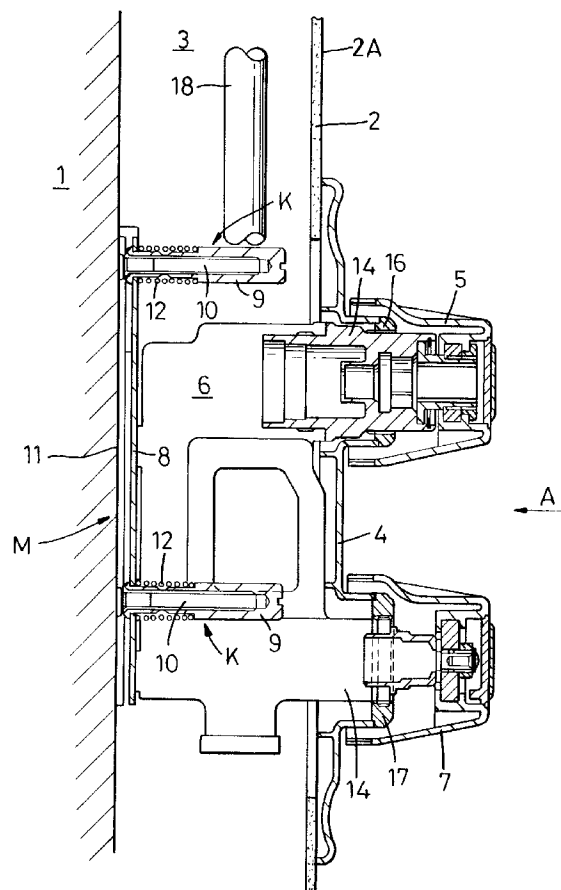
(43) Date of publication:

20.08.1997 Bulletin 1997/34(51) Int Cl.⁶: **E03C 1/042**(21) Application number: **97300864.2**(22) Date of filing: **11.02.1997**

(84) Designated Contracting States:

DE ES FR GB IT SE(30) Priority: **14.02.1996 GB 9603024**(71) Applicant: **THE HORNE ENGINEERING CO. LTD.**
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4 West Regent Street
Glasgow G2 1RS (GB)**(54) Mounting apparatus for pieces of equipment, especially fluid valves**

(57) A special mounting apparatus (M) is provided to support and locate a piece of equipment (6), especially a shower mixing valve in a wall cavity (3) between a base wall (1) and an outer facing (2), the mounting apparatus (M) comprising a support member (11) for securing to said base wall (1), a carrying plate (8) serving to carry a piece of equipment (6) eg fluid valve, and a jacking device (K) for positioning the carrying plate (8) relative to the base wall said device including a plurality of threaded studs (10) attached to the support member (11) and corresponding sleeve-form positioning nuts (9) coupled to the carrying plate (8) and threaded to the studs (10) so as to form a telescopic assemblage therewith, compression springs (12) being present between the nuts (9) and the carrying plate (8). The mounting apparatus (M) permits by selective adjustment of the nuts (9) selective spacing of the carrying plate (8) from the support member (11) and also comprehensive tilting of the carrying plate (8) relative to the support member (11) to cater for angular irregularities at the base wall (1).

**Fig. 2**

Description

The present invention relates to a mounting apparatus for pieces of equipment, in particular fluid valves and more especially mixing valves for use for example in showers.

It is now common practice to fit the valve body of a shower mixing valve into a cavity between an outer surface, especially a tiled surface, and an inner (or base) wall, so that the valve body can be hidden from view along with the pipework connected to the body. There is thus provided a concealed arrangement with only the knobs controlling valve operation and an associated faceplate in view at the outer surface. Access to the valve body is via an aperture in the outer surface and the faceplate serves to cover this aperture.

The depth of the cavity between the outer surface and the inner wall can vary and a difficulty arises in ensuring that the faceplate is satisfactorily located on the outer surface. In prior art shower mixing valves which had their valve bodies substantially directly secured to the inner wall, this problem was solved by locating the valve control knobs on elongate stem portions carried by the valve body, and by having the faceplate slidable on these stem portions to enable the faceplate to engage the outer surface for a certain variation in the cavity depth. A further possible problem is that an angular discrepancy can exist between the outer surface and the inner wall and to meet this problem the aforesaid prior art valve required special skill on the part of the installer to make accurate tapering, packing pieces.

However, this prior art valve had certain disadvantages and in particular the elongate stem portions could detract from desired aesthetic standards especially where a minimal depth of the cavity was present so that the stem portions projected to a marked degree beyond the faceplate. Also the faceplate gasket was of a complex form. It is the principal object of the present invention to provide a mounting apparatus usable with a shower mixing valve to enable the above disadvantages to be overcome. A proposal which substantially avoids certain of the above disadvantages is described in US-A-5046521. In particular US-A-5046521 discloses a dedicated mounting assembly for mounting in-the-wall plumbing fittings such as mixing faucets, the assembly comprising an anchor plate which is fixed by screws to the inner wall while a plurality of threaded studs, in particular three are secured to the anchor plate so as to extend normally from the plate and serve to carry the fitting, to this end the studs being arranged in an array compatible with apertures in support flange means on the fitting. Thus for fitting support the studs extend through respective flange apertures and the fitting is located by a locating nut threaded on a respective stud and engaging an inner surface of the flange means, each locating nut having a sleeve portion extending through the aperture whereby, by having a tool receiving outer end, the locating nut can be adjusted from the out-

er side, while a lock nut threaded on the outer side of the stud engages the outer side of the flange means of for capturing of the flange means in a desired position on the studs.

To dampen sound transmission a U-cross section ring washer is located at each aperture and fills the annular space between the sleeve portion and the flange means, while the relevant lock nut engages a further annular member bearing on a surface of the U-ring. Thus the mounting assembly of US-A-5046521 enables the fitting to be displaced fairly precisely relative to the inner wall but has the disadvantage of being relatively complex and again there is the disadvantage of being unable to accommodate satisfactorily out-of-parallel between the inner wall and the outer facing wall because the mounting does not permit effective tilting of the fitting relative to the anchor plate.

It is the principal object of the present invention to obviate or mitigate these disadvantages.

Therefore according to the present invention there is provided a mounting apparatus for a piece of equipment, especially but not exclusively a shower mixing valve, said apparatus comprising carrying means for a piece of equipment; said carrying means including a support member adapted for securing to a support surface eg a wall at a location point, a carrying member to hold a piece of equipment and a jacking device for the carrying member enabling the piece of equipment to be suitably positioned relative to said support surface, said jacking device comprising a plurality of jacking units whereby the carrying member can be displaced in a normal direction relative to the support surface, and adjustment means to enable the carrying member to be angled or tilted relative to said normal direction to cater for angular irregularities in the securing of the support member. In particular the jacking device can locate the valve body of a mixing valve appropriately in the wall cavity so allowing the valve body to mate with the faceplate and the knobs, the carrying member being secured to the inner wall of the cavity. In particular the present invention permits the knobs to be located at a set position relative to the faceplate, for varying cavity depths.

Preferably said adjustment means includes resilient means for example a spring permitting variation in the angular setting of the piece of equipment e.g. valve body relative to said support wall: in particular these resilient means cater for angular discrepancy between the outer surface and the inner wall in the mounting of a mixing valve in the wall cavity.

An embodiment of the present invention will now be described by way of example with reference to the accompanying drawings wherein:

Fig. 1 shows a schematic side view of a prior art shower mixing valve located in a wall cavity;

Fig. 2 shows a similar view for a shower mixing valve located by means of mounting apparatus in accordance with the present invention, where the

cavity has a minimum depth;

Fig. 3 shows a schematic view to Fig. 2 to a larger scale and with the mounting apparatus shown catering for a cavity of increased depth and the adjustment means shown in greater detail;

Fig. 4 is an end view in direction of arrow A in Fig 2 with the faceplate omitted; and

Fig. 5 shows section X - X on the mounting support plate in Fig. 4.

Fig. 6 shows the portion marked A of Fig. 3 in larger scale, and

Fig. 7 again shows the portion A but catering for an out-of-parallel condition.

Referring firstly to the prior art arrangement in Fig. 1, a thermostatic i.e. shower mixing valve 6 has its valve body 14 located in a wall cavity 3 formed by an inner wall 1 which is usually a structural part of a building and an outer wall 2A for example comprising lightweight panelling which may be provided with a tiled outer surface 2, the pipework (not shown) connected to the valve 6 also being in the cavity so that the valve body 14 and the pipework are concealed. A knob 5 attached to the mixing valve 6 serves to adjust the temperature setting while a further knob 7 connected to the mixing valve 6 is used to turn the flow of mixed water on and off and so regulate the flow rate. A faceplate 4 is placed in contact with the tiled surface 2. The valve body 14 is substantially directly secured to the wall 1 although tapering packing 15 is invariably present to provide a certain positioning of the body. Nevertheless in this prior art valve to ensure that the faceplate 4 can be placed firmly against the tiled surface 2 for different cavity depths elongate stem portions 5A and 7A are present carrying the knobs 5, 7 with faceplate 4 slidable on these stem portions 5A, 7A. As can be seen for a minimal cavity depth as shown in Fig. 1 these stem portions 5A, 7A can extend markedly beyond the faceplate 4. Further the mounting surface provided by wall 1 may be locally out of parallel with wall 2 by a degree α .

Referring now to Figs. 2 to 7 which show the present invention and illustrate an arrangement ensuring the knobs 5 and 7 of the mixing valve are fitted close to and within a dimensional tolerance of the faceplate 4. The mixing valve 6 shown in Figs. 2 and 3 dispenses with the need for the stem portion 5A, 7A of the prior art valve. To this end a special mounting apparatus M is provided for the mixing valve 6 comprising an adjustable support plate 8 to carry the valve and a fixture plate 11.

The mixing valve 6 which advantageously can be in accordance with the valve described and claimed in US-A-5148976 is attached to the adjustable plate 8 by fasteners 8A, while Plate 8 can be positionally adjusted relative to the fixed plate 11 by means of adjusting devices K.

As can be seen in Fig. 4 three jacking or adjusting device K are present arranged in triangular array, and each device K comprises a stud 10 carried by the fixture

plate 11 secured to base wall 1 and an adjusting nut 9 threaded onto the stud 10, the nut 9 being of sleeve form as can be seen from Figs 6 and 7. The stud 10 and nut 9 form a telescopic assembly, the threaded bore of the nut 9 being blind with a slot 23 on the nuts outer end to receive a screwdriver for nut adjustment. It is a feature of the arrangement that the nut 9 is permanently attached to the mounting plate 8, and to this end the nut 9 has a smaller diameter portion 9A onto a neck 9B of which a cap 20 is fitted through an aperture 21 on the plate 8, the cap 20 having an outer flange portion 22 engaging the inner face of the plate 8 while the outer end of the neck 9B is swaged onto the flange portion 22 to secure the nut 9 to the cap 20. Further, for the provision of angular float of the plate 8 the aperture 21 is sized to provide a clearance C with the nut 9.

An angularly flexible but linearly rigid support 12 comprising coil springs or other resilient means, e.g. rubber or polymer bushes, is located on the smaller diameter portion 9A (prior to fitting the cap 20) and so as to be slightly compressed whereby the plate 8 has a large degree of angular float with regard to the studs 10 and, as a result the mounting plate 8 can be adjusted to a substantial angle α relative to the fixture plate 11 (see Fig. 7). Consequently angular discrepancies between the fixture plate 11 mounting plane and surface 2 can be catered for.

In particular, the plate 8 can be simply displaced (d) from the wall which may be stone, brick or roughcast by uniformly adjusting all the nuts 9, or where the plate 11 is out of the vertical (Fig. 7) eg by angle α , due for example to irregularities in the wall by selective adjustment of the nuts 9 the plate 8 can be tilted about the X-X axis and/or about the Y-Y axis to a substantial degree if necessary. As can be seen in Fig. 7, the tilting action is expedited by the flexible (spring) support 12 ensuring that the nut 9 reacts uniformly against the plate 8 the support 12 compressing to one side to allow substantial tilting between the nut 9 and the plate 8, and it will also be noted very substantial angular irregularity can be catered for.

By turning the nuts 9, the mounting plate 8 can be adjusted to a desired distance from the fixed plate 11, for example within a range of 6mm to 41 mm. The faceplate 4 is held against the surface 2, by means of nuts 16, 17 (Fig. 3) on the valve body 14, the nuts 16, 17 being concealed by the knobs 5, 7 positioned close to the faceplate 4. Access to the valve body 14 is via an aperture H (Fig. 4) in the outer wall 2A and the faceplate 4 serves to cover this aperture H. Fig. 2 shows part of the pipework 18.

The above arrangement in accordance with the present invention has the following advantages over previous methods of installing mixing valves.

1. The valve body 6 can be adjusted to suit the final position of the knobs 5 and 7 and faceplate 4.

To ensure a neat and pleasing appearance,

the knobs 5 and 7 and faceplate 4 can be designed conventionally as one unit. The distance from the faceplate 4 to the knobs 5 and 7 can be very short and within a dimensional tolerance, for varying cavity depths.

Prior art mixing valves (Fig. 1) are arranged such that the valve body is fixed to the inner wall with timber packing pieces and the faceplate is capable of sliding on the long cylindrical stems to compensate the variations in distance between the inner wall and the tiled surface. The arrangement however, means that there are long cylindrical pieces between the faceplate and the knobs and the exposed length of the cylindrical piece will vary depending upon the depth of cavity.

This means that the knobs and faceplate do not look as if they were designed as a single unit and the appearance is not pleasing.

2. The adjustable movement in the arrangement of the present invention is substantially more than the length of the cylindrical stems on the prior art valve and therefore, this arrangement can fit wide variations in depth of cavity.

3. It is not necessary to fit packing pieces 15 which must be made on site to compensate for the depth of cavity, and which require skill to be exercised to ensure that they site the valve on a plane parallel to the outer surface.

4. Adjustable plate 8 can be easily adjusted to a substantial angle between it and fixed plate 11. This means that the valve can be quickly and easily mounted in a true and plumb vertical plane.

5. The arrangement makes for ease of installation on site.

6. The telescopic nature of the adjustment allows adjustable plate 8 to be close to fixed plate 11 if desired and this results in a minimal depth 13 and allows the shower mixing valve to be installed in shallow cavity walls.

7. By virtue of the nuts 9 being permanently connected to the mounting plate 8, there is less likelihood of loss of items in the cavity 3, especially at initial installation as could happen for example with items, especially the lock nuts, in the mounting prior described US - A - 5046521. Whereas the above example was concerned with a shower mixing valve, the mounting apparatus M could be used with other fluid valves or indeed with other piece piece of equipment, which may require accurate positioning in terms of depth and/or angular plane of location in space.

Claims

1. A mounting apparatus (M) for a piece of equipment (6), especially but not exclusively a shower mixing valve, comprising carrying means for a piece of equipment, said carrying means including a support member (11) adapted for securing to a support surface (1) eg a wall at a location point, a carrying member (8) to hold a piece of equipment and a jacking means (K) for the carrying member (8) enabling the piece of equipment to be suitably positioned relative to said support surface (1), said jacking means comprising a plurality of jacking units (9, 10) whereby the carrying member (8) can be displaced in a normal direction (d) relative to said support member (11) characterised in that adjustment means (12,C) are provided to enable the carrying member (8) to be tilted (α) relative to said normal direction (d) to cater for angular irregularities in the securing of said support member (11).
2. A mounting apparatus as claimed in claim 1 characterised in that the carrying member (8) is positionally adjusted and located by a single positioning nut (9) of each jacking unit.
3. A mounting apparatus as claimed in claim 1 or 3, characterised in that each jacking unit (9, 10) comprises a threaded stud (10) carried by the support member (11), and a positioning nut (9) of elongate sleeve form coupled to said carrying member (8) and threaded to said stud (10) so as to form a telescopic assemblage with said stud (10) said adjustment means permitting pivoting movement between each positioning nut (9) and the carrying member (8).
4. A mounting apparatus as claimed in any one of the preceding claims characterised in that the adjustment means permit tilting of the carrying member (8) about two orthogonal axes (X-X, Y-Y) relative to the support member (11).
5. A mounting apparatus as claimed in claim 3, characterised in that said positioning nut (9) has a blind bore threadingly fitted on the stud (10) and a recessed outer end (23) to receive an adjusting tool, for example a screwdriver.
6. A mounting apparatus as claimed in claim 2 or 5, characterised in that said adjustment means includes resilient means (12) located between the positioning nut (9) and the carrying member (8).
7. A mounting apparatus as claimed in claim 2 or 6, characterised in that the positioning nut (9) is permanently coupled to the carrying member (8).

8. A mounting apparatus as claimed in claim 7 characterised in that said positioning nut (9) is permanently coupled to the carrying member (8) by means of a cap (20) fitted to the positioning nut (9) and engaging an inner face of the carrying member (8). 5
9. A mounting apparatus as claimed in claim 6 characterised in that said resilient means (12) comprises a compression spring surrounding a reduced diameter portion (9A) of said positioning nut (9). 10
10. A mounting apparatus as claimed in any one of the preceding claims, characterised in that said carrying member (8) is of plate form. 15
11. A mounting assembly for mounting a fluid valve (6) having a valve body (14) with a valve stem projecting therefrom including a control element (5, 7) for controlling a valve setting, said assembly comprising a mounting apparatus (M) as claimed in any one of the preceding claims for mounting said fluid valve (6) in a desired position between a vertical base wall (1) constituting said support surface and an apertured cover wall or facing (2) spaced from said base wall (1) such that the valve stem projects through said aperture (H) of the cover wall (2), said assembly further including a cover plate (4) for said aperture (H) adapted to be held against the cover wall (2) by a nut (16, 17) on said valve stem. 20 25 30

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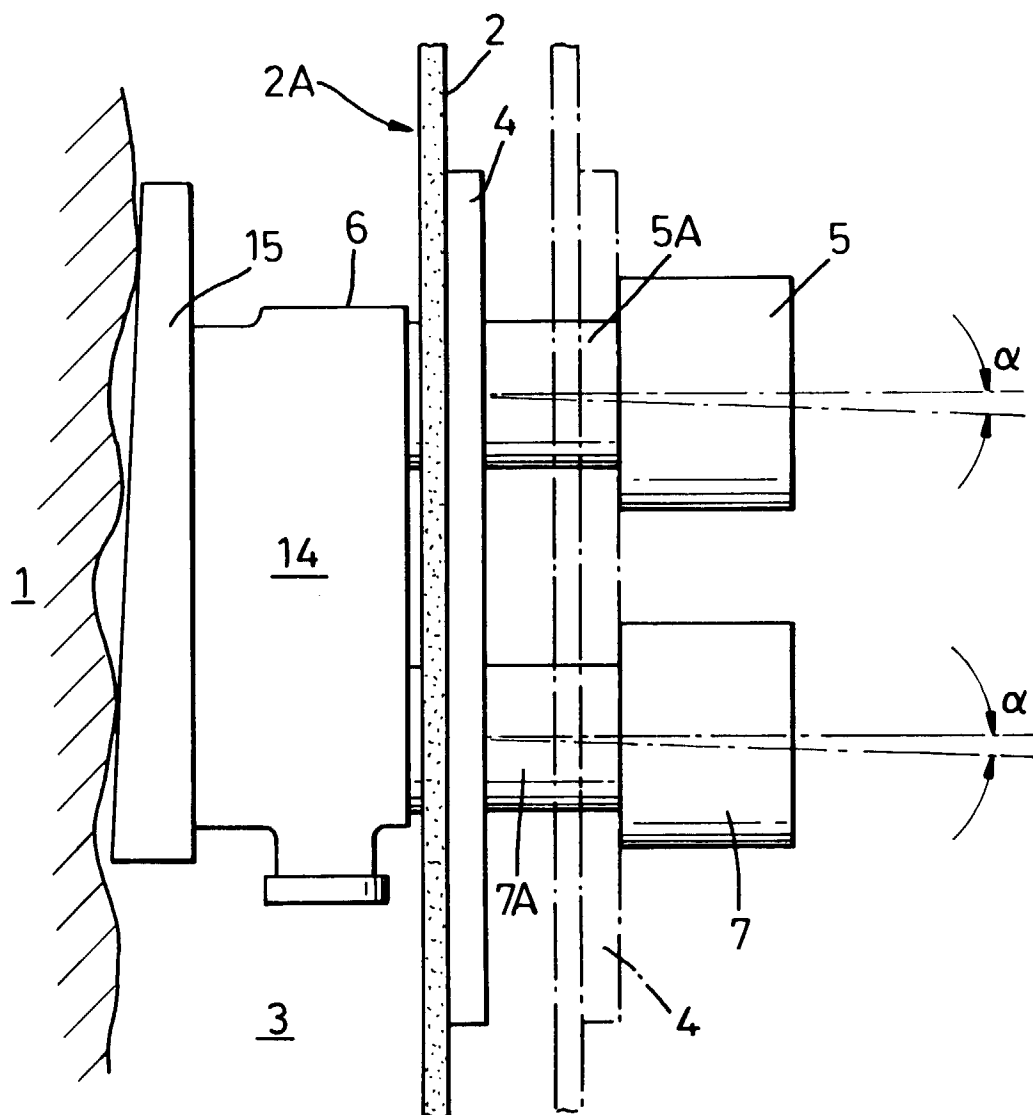


Fig. 1
(PRIOR ART)

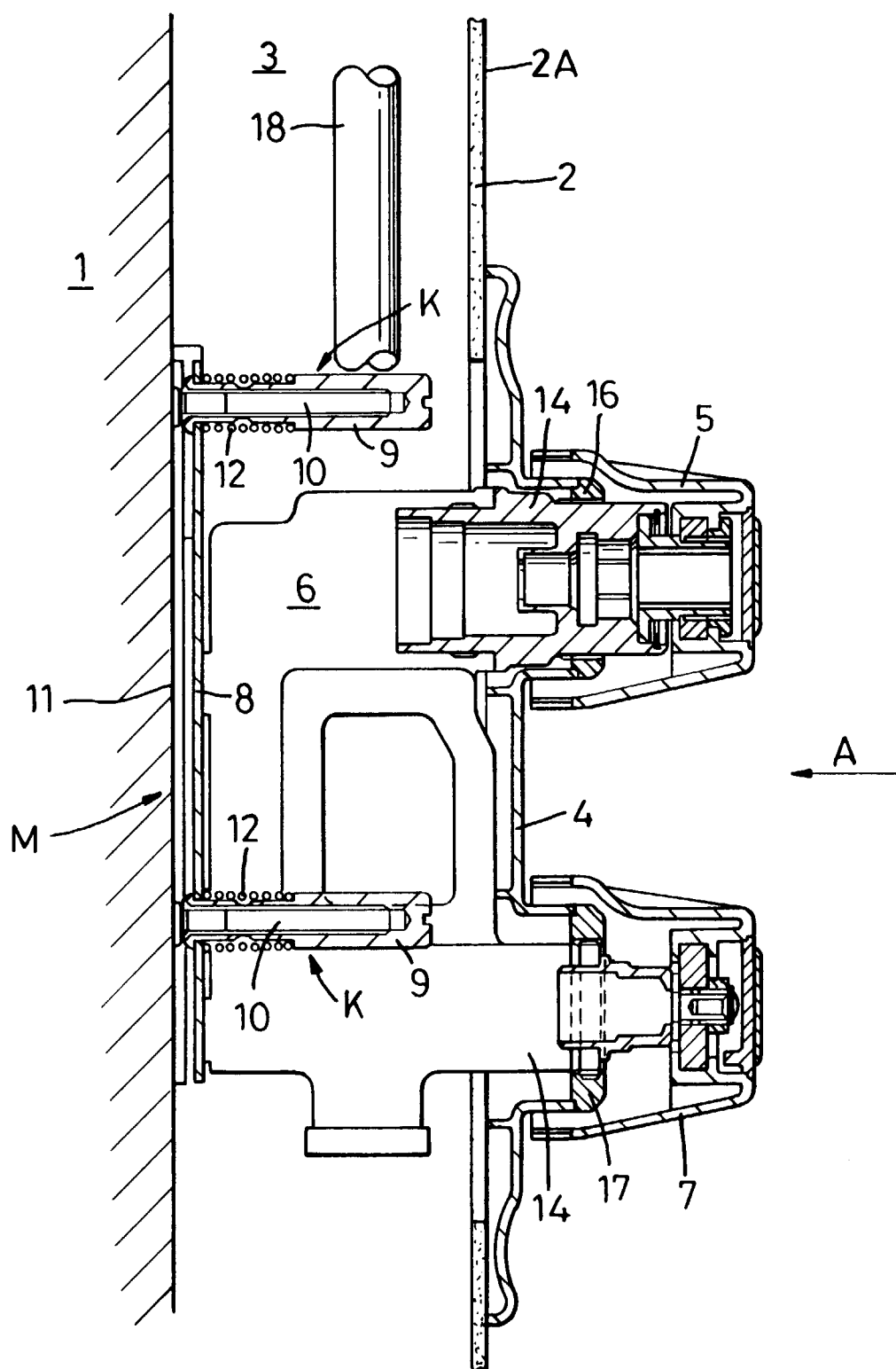


Fig. 2

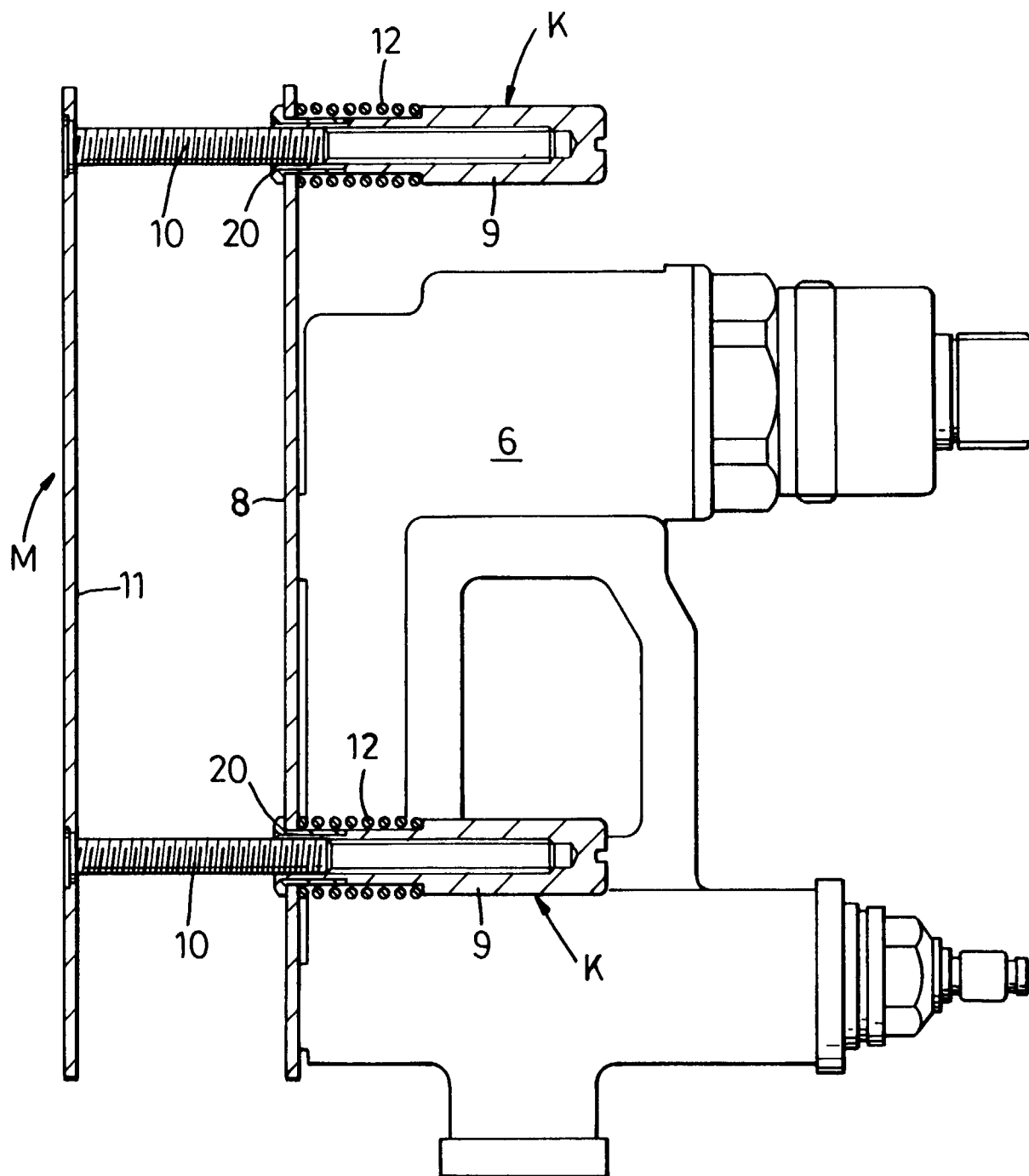


Fig. 3

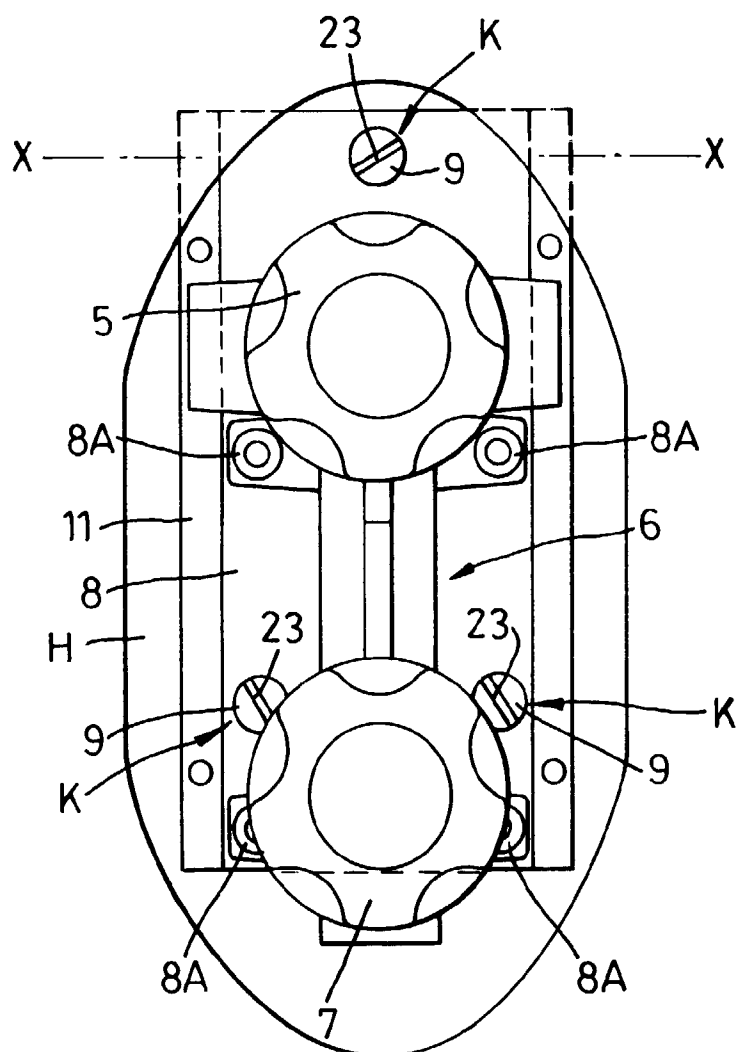


Fig. 4

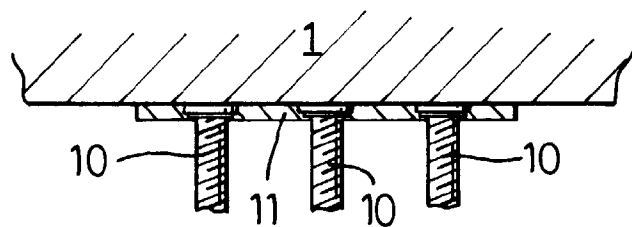


Fig. 5

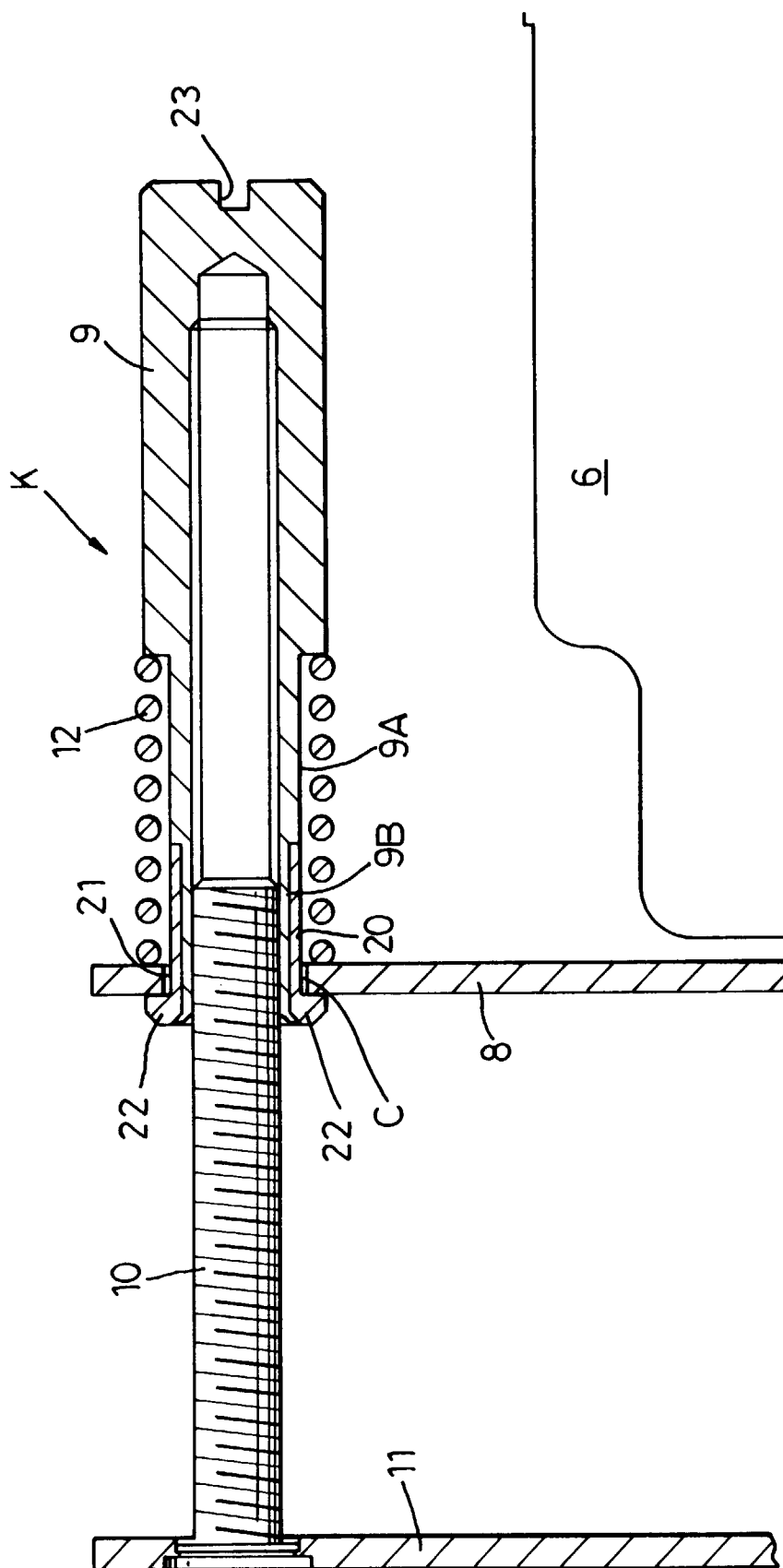
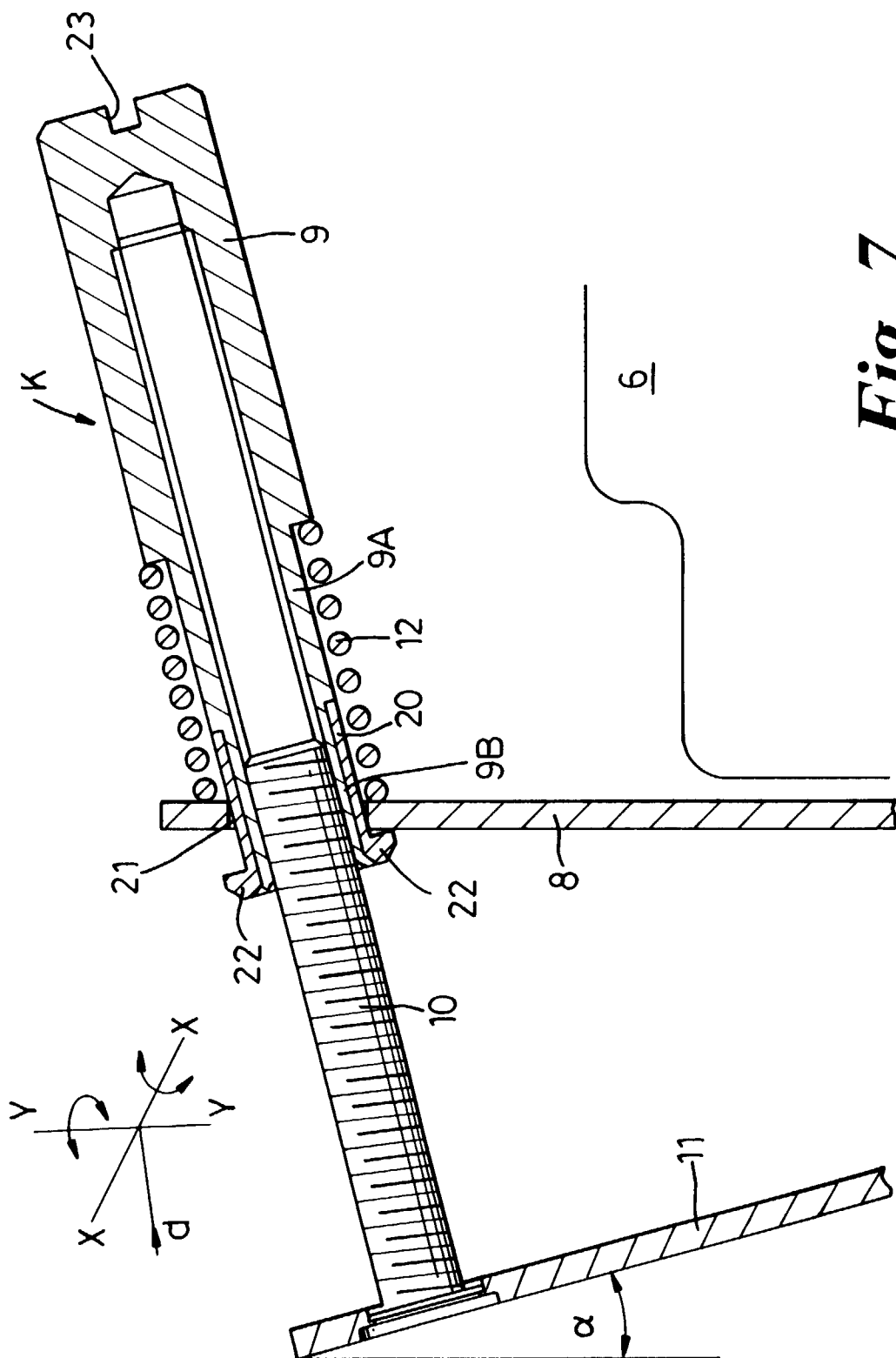


Fig. 6





European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 97 30 0864

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	US 1 835 301 A (HENNESSEY) * page 2, line 6 - line 87; figures 1,2,4,5,8,9 *	1,2,4,11	E03C1/042
D,X	US 5 046 521 A (JENSEN) * column 2, line 46 - line 56; figures *	1-4,11	
X	US 1 970 707 A (RIDEELL) * page 1, line 58 - page 2, column 39; figures *	1-4,10,11	
A	US 3 733 622 A (SEARLESS) * the whole document *	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			E03C
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 24 April 1997	Examiner De Coene, P
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